The Theory Behind the Practice of Regional Economic Modeling

Michael L. Lahr

RUTGERS

Edward J. Bloustein School of
Planning and Public Policy

Model Choices: A Style Preference?

- Regional Input-Output Models
  - Vendors
    - Implan
    - RIMS II
    - Others (R/Econ I-O, EMSI, ...)
  - Advantages
    - Lots of sectoral detail
    - Fairly well understood and established
    - Ready made and relatively inexpensive
  - Disadvantages
    - Static and rigid
    - No obvious price accommodation
      - No substitution
    - Works on averages
    - Data relatively old (labor data for 2005, technology 1997)

Model Choices (cont'd)

- Systems Econometric Time Series Models
  - Vendors
    - Global Insight
    - Moody's Economy.com
    - State university
  - Advantages
    - Flexible
    - Dynamic
    - Tailor-made
    - Data are fresh...often 1-3 months old, at most
  - Disadvantages
    - Expensive
    - Data intensive and dependent
      - More data for states than metropolitan areas or counties
    - Sectors fairly aggregate
    - Lacks representation of technology (no constraint)
    - Rely on historical relationships/responses

Model Choices (cont'd)

- REMI models
  - One vendor
  - Advantages
    - Ready made
    - Moderately flexible
    - Responds to prices
    - Training available
    - Pulls from net experiences across states
  - Disadvantages
    - Not tailor-made
    - Fairly aggregated
    - Data old as in I-O
    - Lacks technology representation except for development of direct effects
    - Some responses are forced
    - Rather expensive...almost as expensive as a SETS model

Model Choices (cont'd)

- Computable General Equilibrium Models
  - No Vendors, built from scratch
  - Advantages
    - Technology structure of I-O and dynamics of SETS
    - Can add modeling of institutions
      - Flow of funds
      - Number of establishments
      - Land use
    - Very flexible
    - Prices
  - Disadvantages
    - Requires special programming software
    - Expensive to build (specialized skills)
    - VERY data intensive
    - Requires sensitivity analysis with regard to certain assumptions embedded in the software on relative elasticities of labor and traded goods/services

Model Choices (cont'd)

- Conjoined models, Frame shifting, etc.
  - Similar to CGE, more a matter of degree
  - Basically I-O models with equations added to facilitate its responses to prices of specific sectors

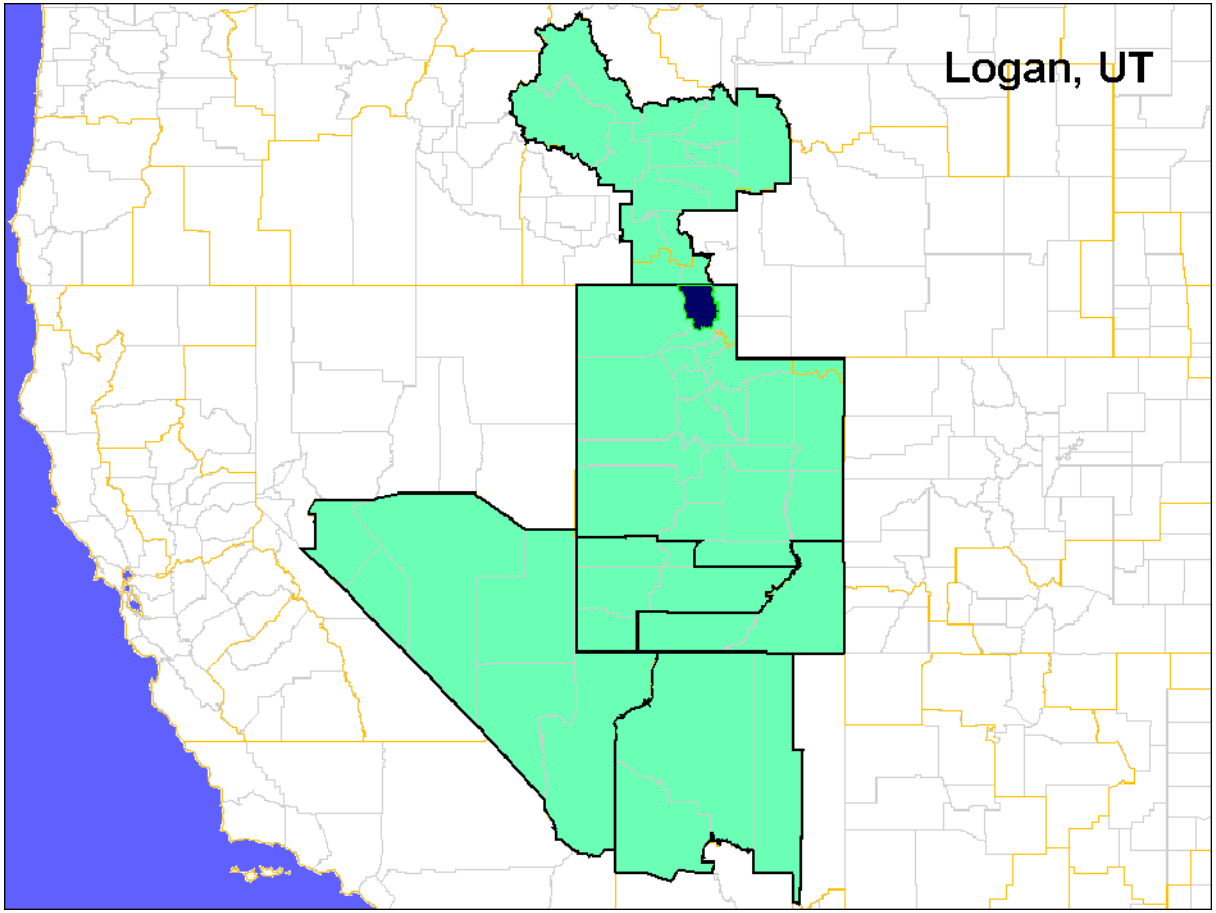
What is the Multiplier for *Activity X*?

- Two regions will yield different multiplier effects for the same disturbance if
  - If their industries have different technology
  - If they have different production portfolios
  - If they have different trade patterns

Geographic Perspective Matters

- Nation, state, metropolitan/micropolitan area, county, city/municipality, …smaller?
- *When reporting*: Depends upon intended audience(s) of the study results`
- *When calculating*: Models ***should*** be built using functional economic areas as the fundamental geographic element
  - Constrained by inherent data dependence
    - *Best data*: states and metropolitan areas
    - *County level:* only detailed employment and payroll data

Functional Economic Areas for Utah



Results of $100 Mill of Demand in SE Utah

	Jobs	Earnings (000 $)	Value Added (000 $)
Admin Model	3,038	49,104.9	76,291.1
FEA Model	1,321	37,139.6	54,649.4

Geographic Perspective Matters (cont'd)

- Regions have different production portfolios
  - Different factor endowments
    - Primary industries
      - Agricultural land quality
      - Mineral resources
    - Different historical human/physical capital stock
      - Labor quality
      - Infrastructure resources
        - Transportation (ports, highways, airports)
        - Communications (TV, internet, newspaper, cell phones)
  - Different abilities to invest
    - Physical capital
    - Human capital
- Yields different specialties and trade patterns

Geographic Perspective Matters (cont'd)

- Imports substitute for local production➔ economic leakage ➔ lower multipliers
- Greater interconnectedness of regional economy ➔ higher multipliers
- Multipliers for an industry can vary radically with geography
- Multipliers for different industries within a region can vary radically as well
- So, apriori, we generally cannot know what the multiplier is for *Activity x*

Issues of Sectoral Aggregation

- If different sectors can have different multipliers, then level aggregation matters...except
- Perfect aggregation
  - must be substitutes or complements
  - must have same production function

Some thoughts on Spurious Aggregation Error: the case of the unwary user

- Demand for aluminum in a steel-producing region
- Demand for fabricated metal in a steel-producing region

- Aggregation error smaller in economies diversified in parallel to nation

Garbage In, Garbage Out

- Be sure to articulate the direct effects as best you can. It means more work, but...
  - Different sectors have different multiplier effects
  - The geography of the disturbance?
    - Demand-based or output-based disturbance
    - How much of each input is purchased from within?
    - How much of the labor used resides in the region?
    - Where do profits and taxes flow?

Interregional Trade Issues

- Knowing trade by industry
  - Helps to estimate direct effects
  - Definitely impinges on multiplier effects
    - Spillovers
    - Feedbacks
- Similar issues with labor
  - The problem with construction workers

Making a Model's Results More Accurate

- Maintain lots of detail
  - Get local representations of technology where it likely diverges from the national
- Try to use models of functional economic areas
- Design regions that address concerns of audiences
- Make sure regional trade is as accurately depicted as is possible
- Is value added (GDP) estimated as accurately as can be?
- Get bid sheets, detailed budgets, or spending patterns for direct effects. Perform surveys if necessary
- If using equations, make sure they reflect structure in ways that will address questions to be answered.

Items for Economic Modelers to Keep in Mind or to Research

- “Backcasting” tests
- Better estimates of interregional trade
  - By mode of transport by industry
- Making CGE and hybrid modeling techniques more accessible
- Making some of the approaches more transparent
- Results in real dollars only (now for 2007)
- Getting all data in present year terms (even if such data are not yet available)
- Explaining “job-years”